7.07

# STANDARD OPERATING PROCEDURES FOR THE COLLECTION AND PRESERVATION OF WADABLE WETLAND WATER COLUMN SAMPLES FOR CHEMICAL ANALYSIS

## Summary

Water column samples of shallow wetlands should be reflective of the whole wetland. To be representative of the entire wetland, samples must be carefully collected, properly preserved, and appropriately analyzed.

Generally, one sample is collected from the wetlands deepest most open area in the largest aquatic zone present. Shallow wetlands are waded or canoed for sample collection. Care must be taken to sample undisturbed water not influenced by bottom sediments stirred up by mucking about. This often requires collecting a mobile sample where the sampler continues to move in a forward direction away from the sediment plume.

## Equipment and Supplies

- Life Vest
- Vest or other garment large enough to carry sampling supplies
- Waders
- Sample containers.
- Acid for sample preservation.
- Sample labels.
- Coolers with ice or frozen gel packs.
- Deionized water for sample blanks and decontamination.
- Filter apparatus.
- For vacuum method.
  - Vacuum filter holder.
  - Vacuum pump.
  - 0.45 µm membrane filters (Millipore HAWP 047 00 or equivalent).
  - Pre-filters (Millipore AP40 0047 05 or equivalent).
  - Stainless steel forceps.
- For peristaltic method.
  - Power Drive (Compact Cat No. P-07533-50 or equivalent)
  - Paristalic head (Easy Load II Cat No. P-77200-62 or equivalent).
  - In-line 0.45 µm cartridge filters (Geotech dispos-a-filter or equivalent).
  - In-line 5.0 µm cartridge pre-filters (Geotech dispos-a-filter or equivalent).
  - Tubing (Masterflex silicone Cat No. P-96400-24 or equivalent).
  - Churn Splitter.

- Field report form.
- Sample ID/Custody Record.
- Black ballpoint pen or mechanical pencil.
- Sample and blank log forms.
- Power ice auger (winter sampling).
- Ice skimmer (winter sampling).
- Sled (winter sampling).

**Procedure**

1. Following collection of the temperature/dissolved oxygen concentration(s), collect sample at fifty percent of the water depth.

2. Triple rinse each sample bottle three times using water from below the surface. This is accomplished by leaving the lid on the bottle, inserting to the correct depth, removing the lid and allowing the bottle to fill with no forward motion.

3. The sample is collected at fifty percent the total water depth using the same method as described in step 2.

4. Preserve the nutrient samples to a pH of $\leq 2$ with 2 ml $1/5^{th}$ sulfuric. Preserve the ICP metals or ICP and Trace metals samples to a pH of 2 with 2 ml concentration nitric acid. Note: Do not preserve the total dissolved phosphorus sample until after filtration which will be accomplished on shore.

5. Place a label on each sample container (Figure 7.07.4). Each sample container should be labeled accordingly with the appropriate analyte group as indicated in Figure 7.07.2.

6. Place the samples in a cooler on ice.

7. Fill out the field report form (Figure 7.07.3), Sample ID/Custody Record (Figure 7.07.2), and the water column chemistry sample log (Figure 7.07.1).

**Field Bottle Blank Sample Collection**

1. Field bottle blank samples are collected with the first sample and every tenth sample (i.e., 1, 10, 20...).

2. Triple rinse each sample bottle using deionized water.

3. Fill each bottle with deionized water.

4. Preserve each sample appropriately. Note: Do not preserve the total dissolved phosphorus sample until after filtering.

5. Place a label on each sample container (Figure 7.07.4). Note: Field bottle blanks should be identified with STORET number 389990. Be sure to indicate on the label the lake name, associated site identification number and the depth of the sample being duplicated.

6. Place the sample in a cooler on ice.

**Field Duplicate Sample Collection**

1. Field duplicates are collected on the first sample and every tenth sample (i.e., 1, 10, 20....). If the sample log indicates a duplicate should be collected, follow the steps below.

2. Collect the sample following step (2) in the procedure for Field Sample Collection.

3. Place a label on each sample container (Figure 7.07.4). Note: Field sample duplicates should be identified with STORET number 389999. Be sure to indicate on the label the lake name, associated site identification number and the depth of the sample being duplicated.

4. Place the samples in a cooler on ice.

**Field Sample Filtration Vacuum Method**

1. Unpreserved total dissolved phosphorus samples should be filtered immediately.

2. Remove filter holder from the plastic bag and assemble.

3. Put on latex gloves

4. Rinse the filter apparatus three times with approximately 250 ml of deionized water each time.

5. Load a pre-filter in the filter apparatus and connect the vacuum pump.

6. Leach the filter twice with approximately 250 ml of deionized water.

7. Filter the sample through the pre-filter. Place the sample back into the sample container.

8. Remove the pre-filter from the filter apparatus and repeat step 4.

9. Load a 0.45 µm filter into the filter apparatus and connect the vacuum pump.

10. Repeat step 6.

11. Filter the sample through the 0.45 µm filter.

12. Triple rinse the sample container with deionized water.

13. Transfer the filtered sample back into the sample container.

14. Preserve the sample with 2 ml 1/5 sulfuric acid lowering the pH to 2 or less.

15. Place the preserved sample in the cooler on ice.

16. If additional samples require filtration, repeat steps 3 through 15.

**Field Sample Filtration Peristaltic Method**

1. Peristaltic filtration method is used to collect dissolved nutrient(s), dissolved mineral(s) and dissolved metal(s). The dissolved nutrient and/or dissolved mineral and metal samples should be filtered and preserved immediately upon reaching shore.

2. Rinse a churn splitter three (3) times with water from the sampling depth.

3. Fill churn splitter with water from the appropriate depth. Note: This often requires taking a 500 or 1000 ml bottle along and filling and emptying it into the churn splitter multiple time until full.

4. Assemble and attach pump head to power drive.

5. Plug in power drive.

6. Put on latex gloves.

7. Remove acid rinsed tubing from plastic bag, taking care to prevent contamination and place in head draping a long end into the churn splitter and dangling the short end out of contact with anything.

8. Turn on pump and rinse tubing with a minimum of 250 ml of sample water from churn splitter.

9. As tubing rinses remove cartridge filter from plastic bag and insert cartridge while pump is still running. Care should be taken to ensure filter cartridge is inserted in the correct direction.

10. Run 250 ml of sample water through cartridge filter.

11. Place labels on bottles.

12. Triple rinse the sample bottles and lids with sample water coming out of the filter cartridge.

13. Fill sample bottles.

14. Preserve nutrient sample with 2 ml 1/5 sulfuric acid and ICP Metals or Trace metals with 2 ml concentrated nitric acid lowering the pH to 2 or less.

15. Place samples in the cooler on ice.

16. If cartridge becomes plugged, repeat steps 6 through 15 with an in-line 2.0 µm pre-filter placed between the pump and the in-line prior to the 0.45 µm filter.

**Water Quality Field Log**
**North Dakota Department of Health**
**Division of Water Quality**
**Telephone: 701.328.5210**
**Fax: 701.328.5200**

| Sample No. | Storet No. | Location/Comment | Depth | Date | Time | QA/QC | | Observer |
|---|---|---|---|---|---|---|---|---|
| | | | | | | DUP | BLK | |
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**Figure 7.07.1** Water Quality Field Log.

| For Laboratory Use Only<br>Lab ID: | |
|---|---|
| Preservation:<br>Yes □ | Temperature: |
| Initials: | |

**North Dakota Department of Health**
**Sample Identification Record**
**Division of Laboratory Services–Chemistry**
**Telephone: 701.328.6140**
**Fax: 701.328.6280**

**Surface Water Sample Identification Code R (Water samples)**
Samples received without this sheet or without all necessary sections fully completed will be rejected and not analyzed.

**Sample Collection/Billing Information**

| **Account #** | **Project Code:** | **Project Description:** | | |
|---|---|---|---|---|
| **Customer (Name, Address, Phone):**<br>SWQMP, Division of Water Quality, Gold Seal Center, 4th Floor | | | | |
| **Date Collected:** | **Time Collected:** | **Matrix:**<br>Water | **Site ID:** | |
| **Site Description:** | | | | |
| **Alternate ID:** | **Collected By:** | | | |
| **County Number:** | **County Name:** | | | |
| **Comment:** | | | | |
| **Comment:** | | | | |

**Field Information/Measurements**

| **Sample Collection Method** (Circle One):<br>Grab DI* DWI** 0-2 meter column | **Depth:** | **Units:** | **Discharge:** | **Stage:** |
|---|---|---|---|---|
| **Conductivity:** | **pH:** | **Temp:** | **Dissolved $O_2$** | **Turbidity:** |
| **Comment:** | | | | |

**Analysis Requested**

| | | | |
|---|---|---|---|
| □ 5) SW-Major Cations/Anions | □ 74) SW-PAHs | □ 33120) SW-E. coli | |
| □ 7) SW-Trace Metals | □ 84) SW-PCBs | □ SW-TOC | |
| □ 21) SW-Carbamates | □ 105) SW-Chlorophyll-a & b Volume Filtered:_____mL | □ SW-DOC | |
| □ 23) SW-Acid Herbicides | □ 118) SW-TSS | □ SW-C-BOD-5day | |
| □ 25) SW-Base/Neut. Pest | □ 144) SW-Trace Metals-dissolved | Other: | |
| □ 30) SW-Nutrients, Complete | □ 160) SW-Nutrients, Complete-dis | | |
| □ 50) SW-Nutrients, Total P-dis. | □ 33080) SW-Fecal coliform bacteria | | |

**Figure 7.07.2** Sample Identification/Custody form. * Depth Integrated ** Depth/Width Integrated

**North Dakota Department of Health**
**Division of Water Quality**
**Lake and Wetland Profile Field Log**
**Telephone: 701.328.5210**
**Fax: 701.328.5200**

| | | | |
|---|---|---|---|
| **Project Code:** | | **Project Name:** | |
| **Site Identification:** | | **Site Description:** | |
| **Date: / /** | **Time: :** | **Ambient Temp:** | **Wind Speed:** |
| **Wind Direction:** | **%Cloud Cover:** | **Secchi Disk: (m)** | **Baro: (mm/Hg)** |
| **Chlorophyll-a:** | **Phytoplankton:** | **Initial DO:** | **Final DO:** |
| **Sample Depths:_____ Meters** | | **Meters _____** | **Meters _____** |
| **_____** | | | |
| **Sampler(s):** | | | |
| **Comments:** | | | |

| Depth (m) | Temp (c) | DO (Mg/L) | pH | Specific Conduct. | Comments |
|---|---|---|---|---|---|
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**Figure 7.07.3** Lake and wetland field form.

**Project Code  Project Description**

**Sample ID  Site Description**

**Analysis: (DC Code)  SW-Analyte Group**
**Container:  Preservative:**
**Date:_ /_ /_  Time:_ :_  Depth:__**
**Sampler_____**

**Project Code  Project Description**

**389990  Field Bottle Blank Sample**

**Analysis: (DC Code)  SW-Analyte Group**
**Container:  Preservative:**
**Date:_ /_ /_  Time:_ :_  Depth:__**
**Sampler_____**

**Project Code  Project Description**

**389999  Duplicate Sample**

**Analysis: (DC Code) SW-Analyte Group**
**Container:  Preservative:**
**Date:_ /_ /_  Time:_ :_  Depth:__**
**Sampler_____**

**Figure 7.07.4** SWQMP Water Chemistry Label, Water Chemistry Blank Label, and Water Chemistry Duplicate Label.